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EXAMINER	
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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex parte KIRKLAND D. BROACH, CARTER E. LUNDE,
and PHILLIP L. HAZLETT

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Appeal 2009-001499
Application 10/751,349
Technology Center 3600

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Decided: April 29, 2010

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Before ANTON W. FETTING, JOSEPH A. FISCHETTI, and BIBHU R. MOHANTY, *Administrative Patent Judges*.

FISCHETTI, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants seek our review under 35 U.S.C. § 134 of the Examiner's final rejection of claims 1, 2, and 4-17. We have jurisdiction under 35 U.S.C. § 6(b) (2002).

Claims 1 and 13, reproduced below, are representative of the subject matter on appeal.

1. A fuel assembly for a pressurized water nuclear reactor including a plurality of elongated nuclear fuel rods having an extended axial length, at least a lowermost grid supporting said fuel rods in an organized array and having unoccupied spaces defined therein adapted to allow flow of fluid coolant therethrough and past said fuel rods when said fuel assembly is installed in the nuclear reactor and a plurality of guide thimbles extending along said fuel rods through and supporting said grid, a debris filter bottom nozzle disposed below said grid, below lower ends of said fuel rods, supporting said guide thimbles and adapted to allow flow of fluid coolant into said fuel assembly, said debris filter bottom nozzle comprising a substantially horizontal plate extending substantially transverse to the axis of the fuel rods and having an upper face directed toward said lowermost grid, said upper face of said plate having defined therethrough at least two different hole designs, the first hole design being a plurality of holes receiving lower ends of said guide thimbles where they are supported by said plate and the second hole design being a plurality of flow through holes extending completely through said plate for the passage of coolant fluid

from a lower face of said plate to the upper face of said plate, each of said coolant flow through holes extending substantially in the axial direction of said fuel rods, in fluid communication with said unoccupied spaces, and in the extended direction at least some of said coolant flow through holes having a profile substantially of a venture with flaring at both ends, wherein the flaring at the lower face of said plate comprises a series of a plurality of concentric countersinks of different included angles and depths into the coolant flow through hole.

13. A fuel assembly for a pressurized water nuclear reactor including a plurality of elongated nuclear fuel rods having an extended axial length, at least a lowermost grid supporting said fuel rods in an organized array and having unoccupied spaces defined therein adapted to allow flow of fluid coolant therethrough and past said fuel rods when said fuel assembly is installed in the nuclear reactor, a plurality of guide thimbles extending along said fuel rods through and supporting said grid, a debris filter bottom nozzle disposed below said grid, below lower ends of said fuel rods, supporting said guide thimbles and adapted to allow flow of fluid coolant into said fuel assembly, said debris filter bottom nozzle comprising a substantially horizontal plate extending substantially transverse to the axis of the fuel rods and having an upper face directed toward said lowermost grid, said upper face of said plate having defined therethrough at least two different hole designs, the first hole design being a plurality of holes receiving lower ends of said guide thimbles where they are supported by said plate, the second

hole design being a plurality of flow through holes extending completely through said plate for the passage of coolant fluid from a lower face of said plate to the upper face of said plate, each of said coolant flow through holes extending substantially in the axial direction of said fuel rods, in fluid communication with said unoccupied spaces, and at least some of said coolant flow through holes having a discrete, double chamfered inlet with each adjacent chamfer of the double chamfered inlet at a different angle than the other adjacent chamfer relative to the axial direction of said fuel rods.

The Examiner relies upon the following as evidence of unpatentability:

Tucker	US 4,118,973	Oct. 10, 1978
Shallenberger	US 4,900,507	Feb. 13, 1990
Johansson	US 5473,650	Dec. 5, 1995
Johansson	US 5,488,634	Jan. 30, 1996
Johansson	US 5,528,640	Jun. 18, 1996
Johansson	US 4,997,621	March 5, 1991

Kreith, F. et.al, Section 3 "Fluid Mechanics" Mechanical Engineering Handbook, Boca Raton; CRC Press LLC, 1999, pages 3-1 and 3-1 90 "Venturisu".

Section 3 "Liquids in Motion" Mechanical Engineers' Handbook, Sixth Edition, McGraw-Hill Book Company, Inc. 1958, pages 3-59 through 3-65.

W. Bussman, Ph.D, et al. Section 3 "Fluid Flow" Industrial Burners Handbook, CRC Press LLC,.2003, Figure 3.3 and section 3.3.3 Eduction Processes.

Sherif, S.A. Section 42 "Fluid Measurements" The Engineering Handbook, Boca Raton; CRC Press LLC, 2000, Figure 42.6 "Venturi tube."

The following rejections are before us for review: The Examiner rejected claims 1, 2 and 4-17 under 35 U.S.C. § 112, second paragraph, as indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The Examiner rejected claims 1, 2 and 7-12 under 35 U.S.C. § 103(a) as obvious over Shallenberger in view of any of Johansson et al. ('621), Johansson ('640), Johansson ('650) or Johansson ('634); claims 4 and 13-15 under 35 U.S.C. 103(a) as being unpatentable over Shallenberger as modified by any of Johansson ('621), Johansson ('640), Johansson ('650) or Johansson ('634) as applied to claims 1, 2 and 7-1 2 above and further in view of Tucker; and claims 1, 2, 4 and 6-17 under 35 U.S.C. 103(a) as being unpatentable over Shallenberger in view of either the Mechanical Engineering Handbook, CRC Press LLC, 01999 or the Industrial Burners Handbook, CRC Press LLC 02003 or the Mechanical Engineering Handbook, SIXTH EDITION, McGRAW-HILL BOOK COMPANY, INC, 01958 and further in view of either Mechanical Engineering Handbook, SIXTH EDITION, McGRAW-HILL BOOK COMPANY, INC, 01958 or Tucker; claim 5 under 35 U.S.C. § 103(a) as being unpatentable over Shallenberger and further in view of the teachings of Chapter 42, Fluid Measurements of The Engineering Handbook, CRC Press LLC, copyright 2000.

The Examiner rejected claims 1, 2 and 4-17 as indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The Examiner objects to the word “series” used in claim 1 because “series connotes a broader meaning than

two adjacent chamfers disclosed within the specification." (Answer 3). We disagree with the Examiner.

Claim 1 requires a plurality of concentric countersinks. Therefore, *series* refers to the plurality of ordered countersinks. The ordinary and customary definition of the term *series* as defined by Merriam Webster's Collegiate Dictionary (10th ed.) is: "a number of things or events coming one after the other spatial or temporal succession." Therefore, we do not find that "series" taken in conjunction with the recitation of a plurality of concentric countersinks is vague because the term refers to the countersinks being ordered in succession, e.g, in series.

The Examiner further objects to the phrase in claim 1 *concentric countersinks of different included angles and depths into the coolant flow through hole* because it is unclear "what all is meant by and encompassed by the phrase" We disagree with the Examiner. An included angle is measured between the surfaces which define the chamfer edge. Claim 1 requires the successively oriented concentric countersinks to have different angles as measured between the surfaces which define the edges thereof.

Similarly, claim 13 recites *a discrete, double chamfered inlet with each adjacent chamfer of the double chamfered inlet at a different angle than the other adjacent chamfer relative to the axial direction of said fuel rods*. This claim, like claim 12, thus requires and sets forth in clear terms that double chamfers be adjacent and that the angle of each chamfer is different from the other. Accordingly, we will not sustain the rejection of claims 1, 2, 4-17 under 35 U.S.C. § 112, second paragraph.

Independent claims 1, 12, and 13 recite in pertinent part:

(1)…wherein the flaring at the lower face of said plate comprises a series of a plurality of concentric countersinks of different included angles and depths into the coolant flow through hole;

(12/13)…holes having a discrete, double chamfered inlet with each adjacent chamfer of the double chamfered inlet at a different angle than the other adjacent chamfer relative to the axial direction of said fuel rods.

The Examiner maintains that the teachings of Shallenberger '507 Johansson '621, Johansson '640, Johansson '650 or Johansson '634 disclose this feature. We do not agree with the Examiner.

With respect to Shallenberger'507, the Examiner maintains that:

> …entire chamfer (50) is indeed made up of, contains, and comprises a series of a plurality of individually discrete chamfers that when considered as a whole, make up the entire chamfer. For example, Shallenberger Figure 7, Item (50) can be considered not only as one chamfer, but also a plurality, or series of chamfers, i.e. chamfer (50) can be made by several different passes of chamfer making device, the first pass making only the first one millimeter of the chamfer, the second pass making the second millimeter, etc. until the chamfer reaches the desired depth. However in and of itself, the one chamfer alone can be considered to be made up of any number of discrete chamfers simply by choosing what exactly delineates a discrete chamfer. By stating that one discrete chamfer is one millimeter long then it appears chamfer (50) is made up of a plurality of approximately 4 to 5 discrete chamfers in series.

(Answer 6).

We disagree with the Examiner. Figure 7 of Shallenberger 507 discloses a single long taper inlet chamfer/countersink 50 communicating with a cylindrical flow hole 48 (col 6, ll. 5-12). The ordinary and customary definition of the term “chamfer” as defined by Merriam Webster’s Collegiate Dictionary (10th ed.) is: “a bevel edge”. Thus, the Examiner’s position that “one chamfer alone can be considered to be made up of any number of discrete chamfers simply by choosing what exactly delineates a discrete chamfer” is not persuasive because since a chamfer is defined as at its beveled edge, there can only be one edge which defines it rather than the infinite points as proposed by the Examiner.

The Examiner maintains that Figure 5D of Johansson ‘621 discloses discrete chamfers that read on items 95 and 70. (Answer 7) However, a review of Johansson ‘621 shows that item 70 is disclosed as a fluid dissipation aperture having a lower portion defined by a relief 75. (Col. 6 ll. 51-60). The lower relief portion 75 is shown curved rather than having a chamfered surface in Figure 5D. The ordinary and customary definition of the term chamfer as defined by Merriam Webster’s Collegiate Dictionary (10th ed.) is: “a bevel edge”. A curved surface as disclosed by surface 75 has no edge. Figure 5D thus does not show doubled chamfered edges or concentric counter sinks at the lower plate face.

Appellants maintain a criticality of the double chamfer arrangement stating that “[t]he objective of the '631 patent in providing a controlled increase in pressure drop to obtain uniform flow is contrary to Applicants'

objective of reducing the pressure drop and thus the reference teaches away from Applicants' invention." (Appeal Br. 22). We thus find that the use of a plurality of concentric countersinks or a double chamfered inlet, of different angles, cause liquid to behave differently than when passing through a rounded inlet or one using only a single chamfer. Thus, this feature distinguishes over the prior art references which use rounded inlets or a single chamfer.

Similarly in Figure 5E, of item 95 of Johansson '621 is a chamfer which leads into a necked down portion of the aperture which in turn communicates with the fluid dissipation aperture 70. The claims require a plurality of concentric countersinks. The ordinary and customary definition of the term countersink as defined by Merriam Webster's Collegiate Dictionary (10th ed.) is: "a funnel shaped enlargement at the other end of a drilled hole." While the chamfer 95 is concentric with the cylindrical necked down portion communicating with it, the cylindrical portion is not funnel shaped or chamfered.

The Examiner next maintains that Figure 5 in Johansson 650 discloses discrete chamfers at the bottom of item 59. However, the lower ends of the openings 59 again have curved surfaces and therefore do not meet the required double countersinks or chamfers.

The Examiner next asserts that Johansson '634 discloses discrete chamfers in the drawing in Figure 17 at 260 (Answer 7). However, a review of the plan views (Figures 14-16 (col.6 ll. 18-20)) of Figure 17 reveals that the openings have a single curved lower surface and Johansson '634

confirms that inlet surfaces 45c are radiussed (col. 9 ll. 48-49).

Since claims 2, 4-11, 14-17 depend from one of claims 1, 12 and 13, and since we cannot sustain the rejection of claims 1, 12 and 13, the rejection of claims 2, 4-11, 14-17, likewise cannot be sustained.

CONCLUSIONS OF LAW

We conclude the Appellants have shown that the Examiner erred in rejecting claims 1, 2, and 4-17.

DECISION

The decision of the Examiner to reject claims 1, 2, and 4-17 is REVERSED.

MP

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